Unit 6, Lesson 15: Equivalent Exponential Expressions

1. Evaluate the following expressions if $x = 3$.

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a. 2^x $2^3 = 2 \cdot 2 \cdot 2 = 8$ c. 1^x $1^3 = 1$ e. $\left(\frac{1}{2}\right)^x$ $\left(\frac{1}{2}\right)^3 = \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{8}$

b. x^2 $3^2 = 9$ d. x^1 $3^1 = 3$

2. Evaluate each expression for the given value of x.

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a. $2 + x^3$, x is 3 $2 + x^3 \to 3 \cdot 3 \cdot 3 \to 27$
                         $2 + 27$ (29)

b. x^2, x is $\frac{1}{2}$ $\left(\frac{1}{2}\right)^2 = \frac{1}{4}$
                         $\to \frac{1}{2} \cdot \frac{1}{2}$

c. $3x^2$, x is 5 $3(5^2)$ $\to 25$ $3 \cdot 25 = (75)$

d. $100 - x^2$, x is 6 $100 - (6^2)$ $\to 36$ $100 - 36 = (64)$

3. Decide if the expressions have the same value. If not, determine which expression has the larger value.

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a. 2^3 and 3^2 No
$2 \cdot 2 \cdot 2 = 8$ $(3 \cdot 3 = 9)$

b. 1^{31} and 31^1 No
$1 < (31)$

c. 4^2 and 2^4 $4 \cdot 4 = 16$ $4 \cdot 4 = 16$ $2 \cdot 2 \cdot 2 \cdot 2$
                     Yes equal

d. $\left(\frac{1}{2}\right)^3$ and $\left(\frac{1}{3}\right)^2$ No
$\frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{8}$ $\frac{1}{3} \cdot \frac{1}{3} \cdot \frac{1}{3} = \frac{1}{27}$

4. Match each equation to its solution.

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A. $7 + x^2 = 16$ 4. $x = 3$
   $9 = 3 \cdot 3$

B. $5 - x^2 = 1$ 3. $x = 2$
   $4 = 2 \cdot 2$

C. $2 \cdot 2^3 = 2^x$ 1. $x = 4$
   $2 \cdot 2 \cdot 2 \cdot 2$

D. $\frac{3^4}{3^x} = 27$ 4. $x = 3$
   $3 \cdot 3 \cdot 3 \cdot 3 = \frac{81}{3}$ will be 27
                                    so
   $2. \ x = 1$

1. $x = 4$

2. $x = 1$

3. $x = 2$

4. $x = 3$

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5. An adult pass at the amusement park costs 1.6 times as much as a child's pass. $1.6x$

a. How many dollars does an adult pass cost if a child's pass costs:

C

$5? $10?
$1.6 \cdot S = \$8$ $1.6 \cdot 10$ w
C $\$16.00$ $1.6w$
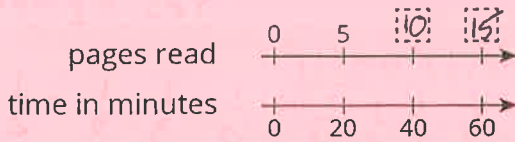
b. A child's pass costs $15. How many dollars does an adult pass cost?

$1.6 \cdot 15 = \$24$
$\uparrow$
C

(from Unit 6, Lesson 6)

6. Jada reads 5 pages every 20 minutes. At this rate, how many pages can she read in 1 hour?

a. Use a double number line to find the answer.

pages read $0 \quad 5 \quad 10 \quad 15$

time in minutes $0 \quad 20 \quad 40 \quad 60$

b. Use a table to find the answer.

pages read	time in minutes
5 ×4	20
10 ×4	40
15 ×4	60

+2 ×2

+3 ×3

$x \div 4$ x

c. Explain which strategy you thinks works better in finding the answer.

Either one works
for a small
number

(from Unit 2, Lesson 14)